Amendments to the Claims:

This listing of claims replaces all prior versions, and listings, of the claims in the application.

Listing of Claims:

1. (Previously presented) A rotary assembly comprising a rotatable shaft; a sleeve journalled on the shaft and adapted to be stationary during rotation of the shaft; an earth vector sensor mounted for rotation with the shaft, the earth vector sensor being responsive to a given physical parameter in a direction substantially radial to the shaft; and an orientation signal generator which comprises a plurality of elements equispaced around the circumference of the sleeve for generating a pulse train representing rotation of the shaft relative to the sleeve as a predetermined number of pulses per revolution, the orientation signal generator deriving from the pulse train and the output of the earth vector sensor the angle between the earth vector and a given point upon the sleeve.

2. (Previously presented) A rotary assembly comprising a rotatable shaft; a sleeve journalled on the shaft and adapted to be stationary during rotation of the shaft; an earth vector sensor mounted for rotation with the shaft, the earth vector sensor being responsive to a given physical parameter in a direction substantially radial to the shaft; and an orientation signal generator which comprises a plurality of elements equispaced around the circumference of the sleeve for generating a pulse train representing rotation of the shaft relative to the sleeve as a predetermined number of pulses per revolution, the orientation signal generator deriving from the pulse train and the output of the earth vector sensor the angle between the earth vector and a given point upon the sleeve, wherein the earth vector is the component of the earth's gravitational or magnetic field along an axis perpendicular to the shaft axis.

3. (Currently amended) An assembly according to claim 1 or claim 2, in which the orientation signal generator further comprises a directional sensor arranged radially of the shaft and cooperating with the plurality of elements.

4. (Previously presented) An assembly according to claim 3, in which the directional sensor is a coil and the plurality of elements are ferromagnetic segments that cooperate with the coil to generate the pulse train.

5. (Original) An assembly according to claim 4, in which the ferromagnetic elements are 24 in number.

6. (Currently amended) An assembly according to claim 2, wherein the orientation signal generator further comprises a directional sensor arranged radially of the shaft and cooperating with the plurality of elements, and operates to integrate the earth vector sensor output over each of a number of successive part-revolutions of the shaft to provide a series of simultaneous equations, and to solve these equations to provide an orientation angle for each of said plurality of elements with respect to the earth vector.

7. (Original) An assembly according to claim 6, in which said part-revolutions are quarter revolutions.

8. (Currently amended) An assembly according to claim 6, in which said simultaneous equations are as defined in equations (vi) to (ix) below:

$$Q1 = -Kl.\sin\alpha + Kl.\cos\alpha + K \quad \text{(vi)};$$

$$Q2 = -Kl.\sin\alpha - Kl.\cos\alpha + K \quad \text{(vii)};$$

$$Q3 = Kl.\sin\alpha - Kl.\cos\alpha + K \quad \text{(viii)};$$

$$Q4 = Kl.\sin\alpha + Kl.\cos\alpha + K \quad \text{(ix)}; \text{ and}$$

wherein Q(n) are the earth vector sensor outputs, K1 and K are constants, and α is the orientation angle.

9. (Previously presented) A downhole assembly according to claim 2, in which the sleeve forms part of a gamma ray detector that detects gamma radiation strength transverse to the drill string axis.

10. (Previously presented) A method of sensing the angular position of a rotary assembly which comprises a rotatable shaft and a sleeve journalled on the shaft and adapted to be stationary during rotation of the shaft; the method comprising sensing an earth vector along an

axis transverse to and rotating with the shaft, providing a plurality of elements equispaced around the circumference of the sleeve for generating a pulse train representing rotation of the shaft relative to the sleeve as a predetermined number of pulses per revolution, and deriving from the pulse train and the earth vector the angle between the earth vector and a given point upon the sleeve.

11. (Previously presented) A rotary assembly comprising a rotatable shaft; a sleeve journalled on the shaft and adapted to be stationary during rotation of the shaft; an earth vector sensor mounted for rotation with the shaft, the earth vector sensor being responsive to a given physical parameter in a direction substantially radial to the shaft; and an orientation signal generator which comprises a plurality of elements equispaced around the circumference of the sleeve for generating a pulse train representing rotation of the shaft relative to the sleeve as a predetermined number of pulses per revolution, and means for deriving from the pulse train and the output of the earth vector sensor the angle between the earth vector and a given point upon the sleeve.